

## Task 2.2

### Task Title

Socio-economic drivers of future hydropower production

### Research Partners

Swiss National Institute of Forest, Snow and Landscape Research (WSL), Research Center for Sustainable Energy and Water Supply (FoNEW) at the University of Basel, Institute for Environmental Sciences (ISE) at the University of Geneva, University of Applied Sciences (HTW Chur), University of Applied Sciences and Arts Western Switzerland (HES-SO)

### Current Project (presented on the following page)

Sustainability Assessment: Integrated Sustainability Assessment of Hydropower projects

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Swiss Concession Renewal: Challenges and Opportunities in the current context

G. Voegeli, L. Gaudard

### Task Objectives

Within the Energy Strategy 2050 hydropower is envisioned to increase production (which includes the need for retrofitting older hydropower plants), is supposed to provide the needed flexibility to accommodate large shares of renewable energy generation, and plays an important role in regional economies and developments (especially in mountain cantons). Understanding the impact of current and future market and policy conditions will be crucial for the development of the Swiss hydro system.

The socio-economic boundary conditions and their impact on the Swiss hydro system will be analyzed in cooperation with associated research partners from the SCCER CREST and the SCCER-FURIES developing evaluations of the Swiss transmission system. They will provide assessments of the future development of liberalized electricity markets with a high share of intermittent generation based on bottom-up market models.

### Highlights 2016

Task 2.2 has continued the analysis on market potentials for Swiss hydropower plants in a low price environment within the NRP70 framework and intensified exchange between CREST and SoE on ex-change of market results and technical developments. The current findings on market and regulatory constraints have been presented in a joint session at the 39th Annual Conference of the International Association for Energy Economics in Bergen, Norway. Together with colleagues from Europe the current findings could be discussed. The main challenge for Swiss hydro plants remain the low market prices. Modelling results from Task 2.2 show potential for revenue increase if the flexibility of hydro plants is utilized at balancing markets and with optimized short term operation. A stakeholder workshop is projected for October 2016 to further discuss the findings with the Swiss hydro community.

# The Future of Swiss Hydropower: Sustainability Assessment

## Integrated Sustainability Assessment of Hydropower projects

### Sustainability Assessment

**Generic approach.** It is based on the scientific literature review, which itself allows the first mapping process.

### Stakeholder Dialogue

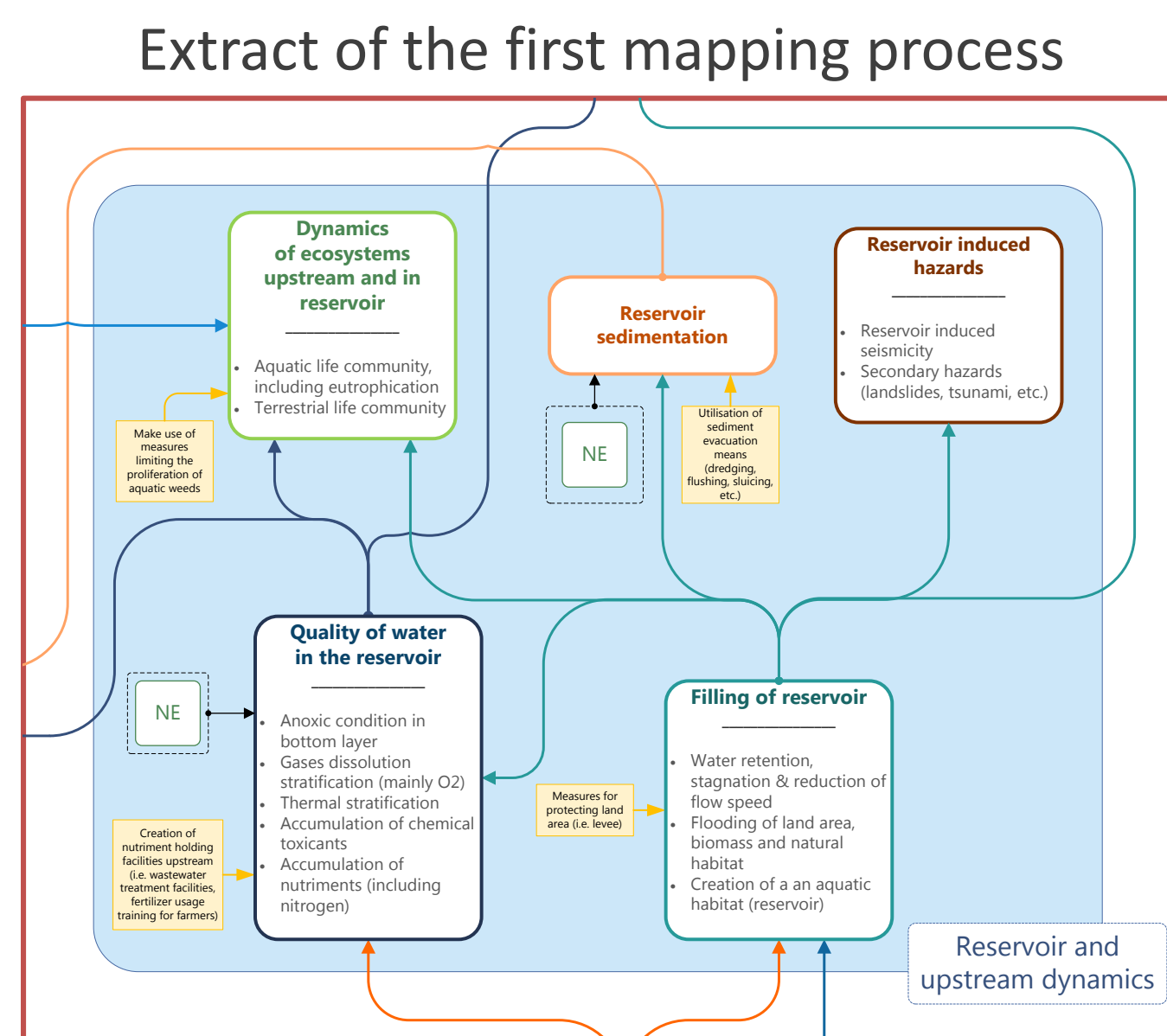
**Generic approach.** It is based on the identification of key stakeholders and their major concerns. This step leads to the identification of “community values” and specific indicators.

### Generic Model / Framework

Comprehension and **mapping** of the interdependence and interactions of main variables in a **systemic** way

Comprehension and **mapping** of the interdependence and interactions of main variables from a stakeholders' perspective

#### The “2 Sides of the Coin”:



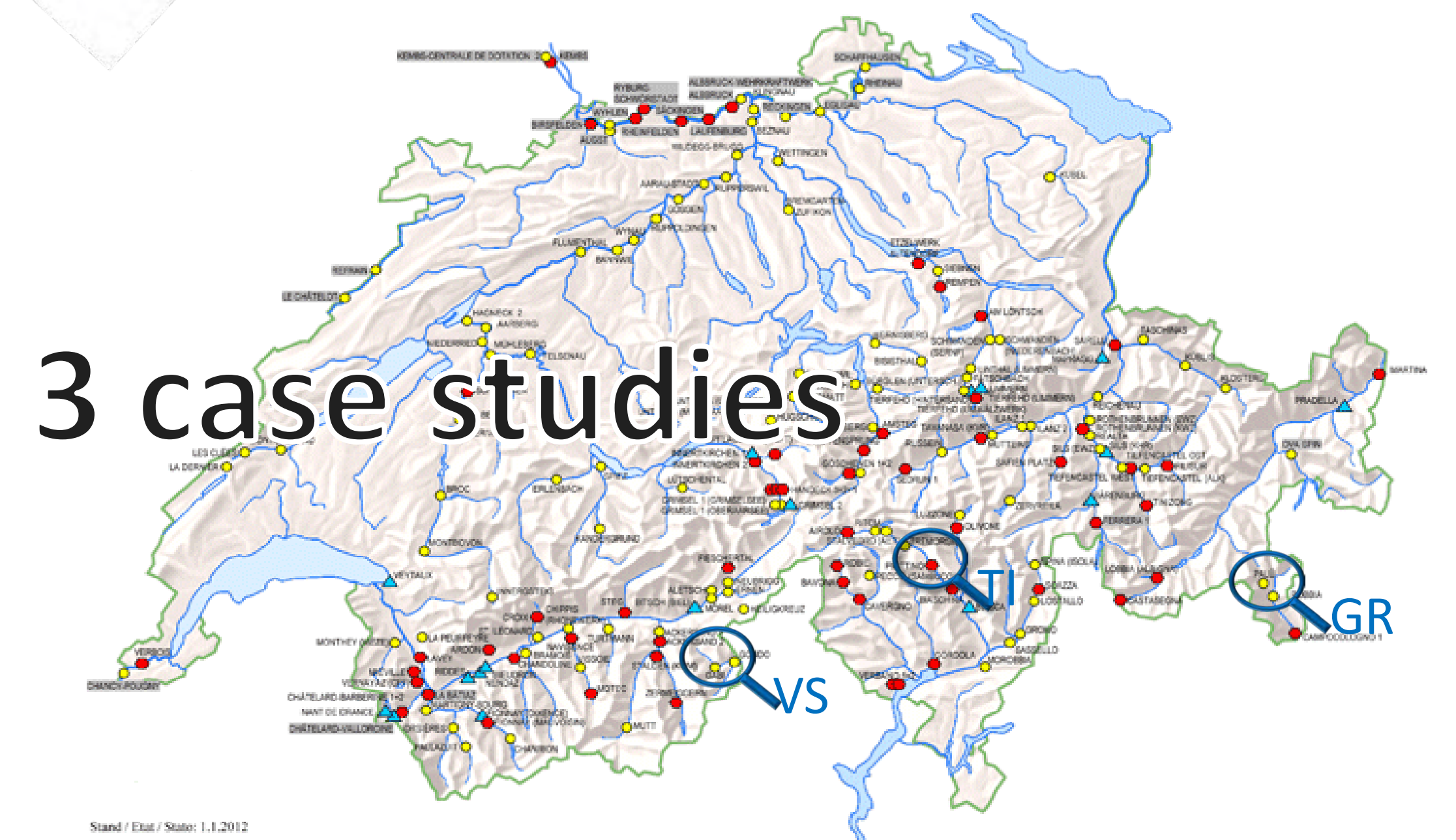
#### Stakeholder view and valuation



Elaboration of an **integrated stakeholder process**, based on scientific information and stakeholder valuations

**System view and representation** (HP plants and their impacts)

**Theoretical approach** based on the concepts of **sensible sustainability** (Serageldin, 1996) and the **sustainability-based social value function** (Hediger, 2000) and its application to the **corporate level** (Hediger, 2010)



## Integrated Sustainability Assessment

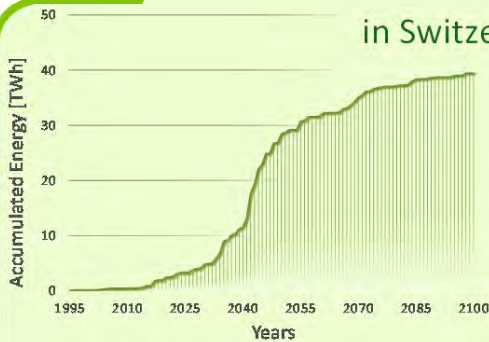
# The Future of Swiss Hydropower (HP): Swiss Concession Renewal

## Challenges and Opportunities in the current context



Renewal of HP concessions is a **imminent issue**, as discussions can take place **15 years** prior to actual renewal

Current context in Switzerland



End of HP concessions in Switzerland, by average yearly production

In Switzerland, the water fee system is imposing companies on the **installed power**, not on the annual power production or on the profit resulting from operation

Current electricity prices and context largely limit the launch of new investments in HP in Switzerland

Electricity prices in Europe have **drastically dropped** in the recent years, leading to new tensions for new and retrofitted HP plants implementation and operation

1 ... Coping with uncertainty by increasing the **managerial flexibility** of the hydropower project

Some contributions to those imminent challenges can be provided and are currently under research, by...

2 ... Developing a **generic framework for sustainability assessment**, allowing a comparable and systematic evaluation of projects

3 ... Improving the **bidding process** of the concession, to ensure sustainability and rent value are taken as major criteria

The **rent value assessment** is largely challenged by the existence of **uncertainties** (eg. long term assessment, confidentiality of companies). However, underestimation of the rent value can lead to **competition law infringement**

**Work in progress**

However, serious **challenges** have to be addressed in this renewal phase of water rights to use HP

Long lasting infrastructure, large **positive and negative impacts** and **high investments** increase the necessity for HP to reach the highest level of sustainability

Necessity to ensure the highest level of **sustainability** in HP plants construction, retrofitting and future operations

Necessity to ensure the highest level of **rent** for local communities

HP relies on **renewable** natural cycles, and might afford large contribution to shutting down existing fossil-fuel and nuclear power plants

Legal aspects

Granting and management of concessions is a **cantonal competency** in Switzerland. As such, conditions largely vary between cantons. The maximal length of **80 years** is set at the Federal level. However, some cantons chose to reduce this length down to 40 years

In the current and coming years, a **unique window of opportunity** for concession renewal is opening

Scientific literature  
Voegeli, Gaudard, Hediger and Romerio (2016), *Framework for decision-making process in granting rights to use hydropower in the European Context*.